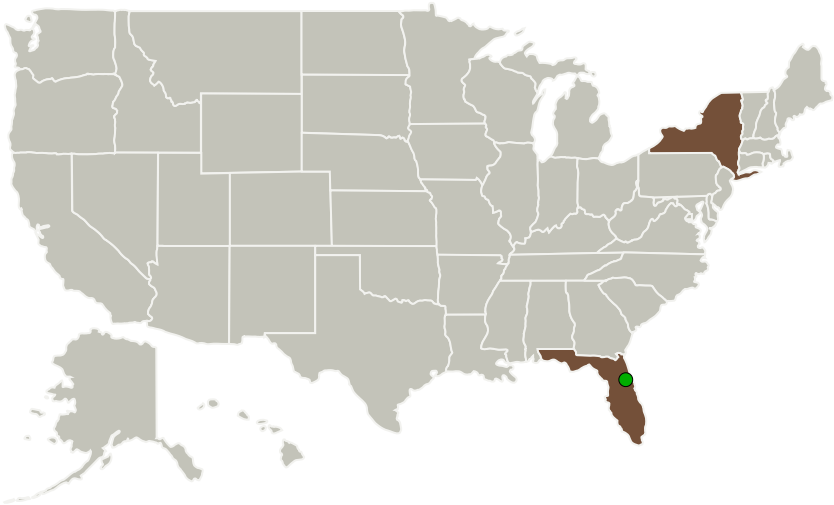
Automated Hybrid Microwave Heating for Lunar Surface Solidification, Phase I

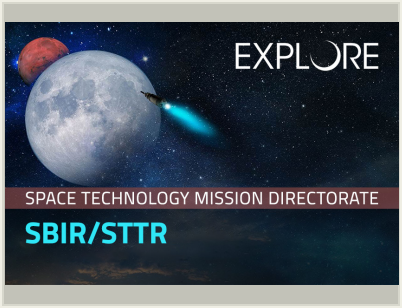
Completed Technology Project (2010 - 2010)

Project Introduction

This SBIR project addresses the need for a system that will provide automated lunar surface stabilization via hybrid microwave heating. Surface stabilization is paramount to future lunar missions due to severe complications from dust on the Apollo space missions. This project focuses on development of a microwave surface solidification device, which could be incorporated into a roving system, to provide adequate working planes for robotic and manned operations. Phase I will demonstrate microwave system feasibility using advanced computer modeling and sophisticated laboratory experimentation with lunar simulant. Research will target surface heating of deep powder beds to best simulate in-situ use. Microwaves coupled with radiant heat sources will maximize heating efficiency. Hybrid microwave heating models will provide process optimization, direct correlations to lunar regolith heating, and a foundation for advanced automated control systems. Ceralink has assembled a team including research partner Rensselaer Polytechnic Institute and commercialization partner Gerling Applied Engineering to successful bring this technology from a TRL 2 to a TRL 4 in Phase I. The team is well positioned to achieve TRL 6 with prototype demonstrations by the completion of Phase II, and ultimately deliver a fully functioning system.

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
Ceralink, Inc.	Lead Organization	Industry Women-Owned Small Business (WOSB)	Troy, New York
Kennedy Space Center(KSC)	Supporting Organization	NASA Center	Kennedy Space Center, Florida

Primary U.S. Work Locations	
Florida	New York

Project Transitions

January 2010: Project Start

July 2010: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138836)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Ceralink, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

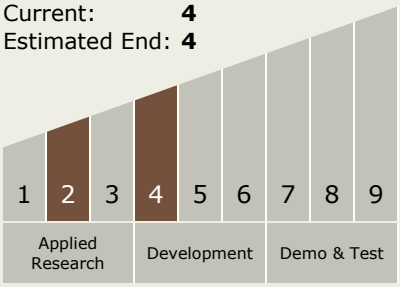
Carlos Torrez

Principal Investigator:

Shawn M Allan

Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **4**



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Technology Areas

Primary:

- TX07 Exploration Destination Systems
  - TX07.1 In-Situ Resource Utilization
    - TX07.1.4 Resource Processing for Production of Manufacturing, Construction, and Energy Storage Feedstock Materials

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System